

# **2003 PHEASANT WORKSHOP IDENTIFICATION OF KEY MANAGEMENT STRATEGIES FOR WASHINGTON STATE**

## **MEETING SUMMARY and Management Recommendations**



Courtesy of Pheasants Forever

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### Acknowledgement

The Washington Department of Fish and Wildlife (WDFW) would like to express great appreciation to the state fish and wildlife agencies of South Dakota, Iowa, and Kansas as well as the Wildlife Management Institute and the Natural Resource Conservation Service for supporting their biologists' participation in this workshop. Participation by the Pacific Northwest Direct Seed Association was also appreciated. Finally, WDFW would like to thank Senator Bob Oke, Pheasants Forever, and the Big Bend Economic Development Council for their involvement in and sponsorship of this workshop.

## Introduction:

In Washington, there has been a wide variation in pheasant harvest and hunter participation over the past 50 years. Harvest was at its highest during the mid 1960s with another peak in the late 1970s, when over 500,000 pheasants were harvested statewide. Since that time, pheasant harvest has been declining steadily. By using harvest as an index to population status, it is apparent that pheasant populations in Washington currently are much lower than they were in the 1960s and 1970s (Figure 1). In addition, surveys (crowing count and brood index) conducted between 1984 and 1998 indicate a decrease in pheasant numbers in eastern Washington during that time (Rice, 2003).

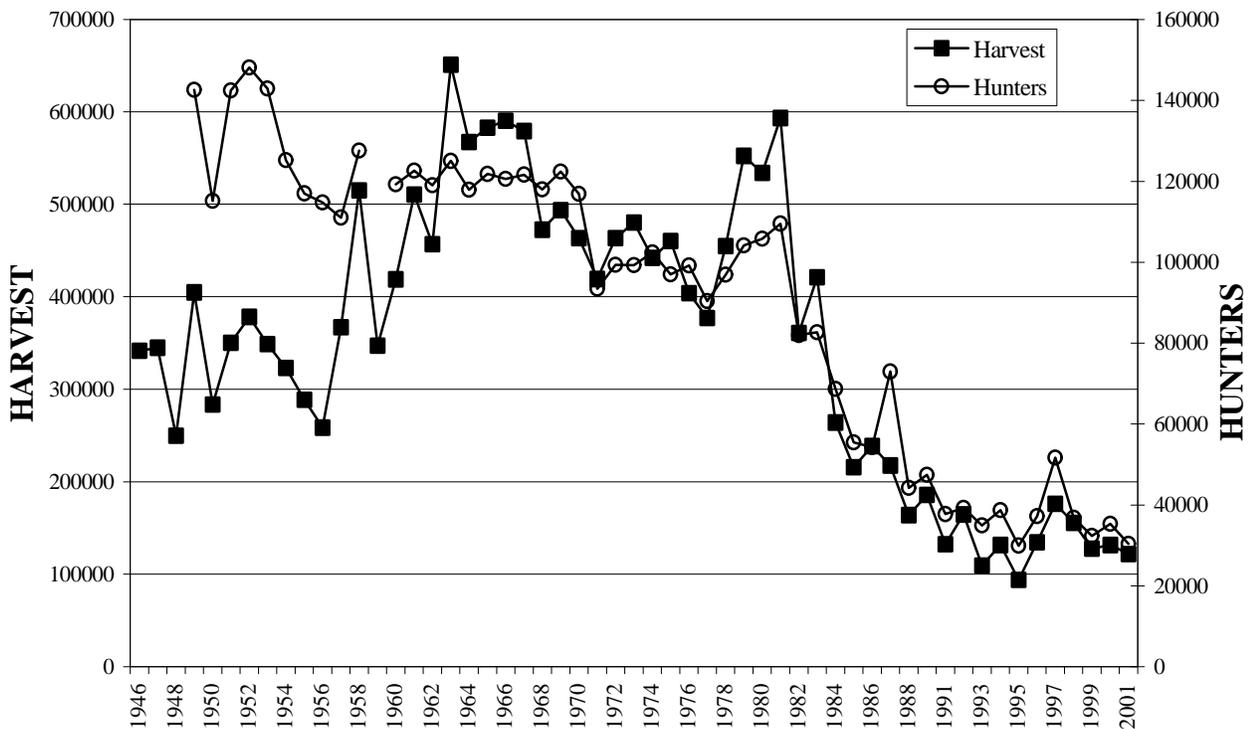


Figure 1. Estimated annual pheasant harvest and hunter participation in Washington 1946-2001.

The cause or causes of the decline in pheasant populations in Washington is not known definitively, however, it is likely that several factors are working together to influence the result. Pheasant research in many parts of the United States indicates that loss of habitat is the primary reason pheasant populations decline. Of particular importance are breeding habitat (including nesting and brood rearing habitat), wintering habitat, and habitat that provides escape cover.

This workshop was developed to collect information that would help identify at least five key pheasant management strategies that would give the greatest chance of successfully increasing naturally occurring pheasant populations in Washington. Experts in the field of pheasant management were brought in to discuss management strategies in areas where pheasant populations historically have been high and to discuss research findings and management programs that may help address population declines in Washington. Approximately 75 people attended the meeting, including both general public and state agency personnel.

## Participant Biographies

### Tony Leif (Senior Wildlife Biologist, South Dakota Department of Game, Fish and Parks)

Since becoming a wildlife biologist with South Dakota Game Fish and Parks (SDGFP), Tony has coordinated the implementation of habitat programs designed primarily to enhance pheasant abundance on private lands. Tony also conducts pheasant research for SDGFP, most recently completing a 5-year study of pheasant survival and habitat selection during the breeding season. During a previous project, he evaluated the effectiveness of releasing pen-reared hen pheasants in the spring. Tony also has the luxury of carrying the title of State Pheasant Biologist in a state where pheasant harvests are the highest of any state or province in North America.

### Terry Riley (Dir. of Conservation, Wildlife Management Institute, Washington, D.C.)

Terry Riley has been a professional biologist for over 20 years and has been working for the Wildlife Management Institute (WMI) in Washington, D.C. since 1999 where he is currently the Director of Conservation. His primary duties at WMI include coordinating the delivery of technical and scientific wildlife related information to the U.S. Congress, the Administration, the U.S. Forest Service, the Natural Resources Conservation Service (NRCS), and the U.S. Fish and Wildlife Service among others. Prior to his current position in Washington, D.C., Terry was WMI's Midwest Field Representative since 1994 stationed first in Iowa and then South Dakota. In addition, Terry was a research biologist for the Iowa Department of Natural Resources for six years where he was one of two primary investigators on a 5-year study of ring-necked pheasant ecology. Terry also served as a wildlife biologist for the US Forest Service for 8 years in Wisconsin and South Dakota.

### Randy Rodgers (Wildlife Biologist, Kansas Department of Wildlife and Parks (KDWP)):

Randy Rodgers is a wildlife biologist based in Hays, Kansas who has worked in western Kansas for 24 years. Randy has been an upland game bird specialist for his entire career. His main emphasis has been on finding and promoting economically and socially sound farm practices that incorporate good soil, water and wildlife conservation and has several publications relating to pheasant biology and management.

### Tim Melville (Pacific Northwest Direct Seed Association)

Tim Melville has been in production agriculture (wheat, barley, peas) since 1973. He is a veteran direct seeder (no-tiller), dating back to 1979. He has been an active board member of the Pacific Northwest Direct Seed Association since its beginning in January 2000. His passion is to tell the world about the many attributes of direct seeding, including the tremendous wildlife and environmental benefits.

### Todd Bogenschutz (Upland Wildlife Research Biologist, Iowa Department of Natural Resources)

Todd Bogenschutz has been an upland wildlife research biologist for the Iowa Department of Natural Resources (IDNR) since 1995. Todd's research in Iowa has focused on United States Department of Agriculture (USDA) Farm Bill programs and their impacts on upland wildlife populations. IDNR has also worked closely with Iowa State University to develop a spatially explicit, individually based habitat model to determine the impact of various USDA programs, primarily the Conservation Reserve Program (CRP), on pheasant populations.

### Alan Fulk (Natural Resources Conservation Service (NRCS))

Alan Fulk has worked for the NRCS for 19 years. He was the District Conservationist in Yakima County for the past nine years prior to becoming the Program Liaison for the central part of Washington State. His current responsibilities include: assisting and providing leadership in the development, management and direction of the Farm Bill programs.

## Presentation Summaries:

### Evolution of Pheasant Management in South Dakota (Tony Leif):

- The first pheasant hunting season in South Dakota was in 1919 - a one day season. By 1934, pheasants were being hunted in nearly every county with a season length varying from 5 to 99 days depending on the county. Currently, pheasant season is 74 days in most of South Dakota.
- Over the last 37 years, pheasant harvest in South Dakota has varied between 400,000 and 1.5 million. The average harvest over the past 10 years has been 1.25 million (Figure 2).

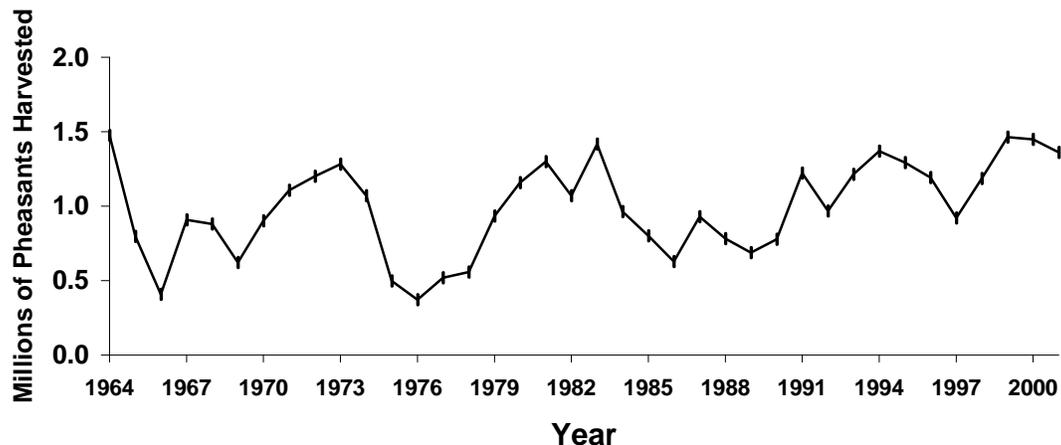


Figure 2. Estimated pheasant harvest in South Dakota from 1964 to 2001 (SDGFP data).

- Habitat quality and quantity is responsible for robust pheasant populations in South Dakota, especially breeding habitat, habitat for avoiding predators, and habitat for winter survival.
- South Dakota tested three different pheasant release programs (chicks in summer, hens in spring, and roosters in fall). Evaluations of the three programs led SDGFP to eliminate all release programs since they were either ineffective (chick and hen release) or cost-prohibitive (rooster release). They decided to focus on habitat instead of releasing birds.
- South Dakota has had a pheasant habitat enhancement program since 1975 that is funded by a special pheasant stamp. The enhancement program focuses on projects that complement the federal Conservation Reserve Program (CRP) (nesting and food plots) as well as winter habitat. Over the past 25 years, over \$550,000 per year has been spent enhancing pheasant habitat.
- A new focus is public access to private lands. From 1997 to 2001, an average of \$632,000 per year has been paid to private landowners willing to allow unlimited public hunting on their property. Payments to landowners are based on habitat quality and total acreage included in the agreement.
- Predator control is often looked at as a “fix” for pheasant populations. In fact, predator control can work for a limited time, but ONLY if adequate habitat exists prior to predator control efforts. Even if implemented correctly (i.e., a concentrated effort in the spring), predator densities return soon after the control program is terminated. The focus should be on controlling predation, which is usually a function of habitat quality. If habitat is adequate then predator control will likely be less effective or not needed.

- A handful of management options were evaluated through the years:
  - Manipulation of season structure: This had little effect due to rooster only harvest.
  - Raising and releasing pheasants: This was ineffective at increasing pheasant densities.
  - Habitat Programs: These are the KEYS to successful pheasant management.
  - Localized Predator Removal: This can work temporarily, but only AFTER adequate habitat is established. Even then, costs associated with such a program are high.
- Private landowner cooperation is necessary to be successful in managing pheasants. In order to encourage private landowners to manage for pheasants, there needs to be an economic incentive. The federal farm bill provides the most effective means of providing that incentive.

Farm Bill Programs and Managing Pheasants on a Landscape Basis (Terry Riley):

- The newest Federal Farm Bill has many programs in which landowners may participate. These programs are designed to accomplish many things, including:
  - Reduce soil erosion, improve water quality and provide wildlife habitat (CRP);
  - Establish and protect riparian habitat and grass buffers along waterways and around wetlands (Conservation Reserve Enhancement Program);
  - Protect and restore wetlands and adjacent uplands (Wetland Reserve Program);
  - Restore and protect of grasslands and shrublands (Grassland Reserve Program);
  - Protect farm and ranch lands from development (Farm and Ranch Land Protection Program and Grassland Reserve Program); and
  - Develop wildlife habitat (e.g. Wildlife Habitat Incentives Program (WHIP) and the Environmental Quality Enhancement Program (EQIP)).
- Farm Bill funding for conservation over the next five to six years will range between \$17-\$18 billion, nationwide.
- The CRP program may be the most successful program to date, largely due to the number of acres enrolled (approx. 34 million nationwide and 1.28 million in Washington) and the money allotted. When considering pheasants, CRP has limited potential in irrigated areas due to high land values. CRP has more potential to benefit pheasants in areas with 14-30 inches of annual precipitation.
- Pheasant management needs to be done on a large scale, perhaps hundreds of thousands of acres. Small, scattered plots of habitat will not accomplish desired results.
- Research has shown that if at least 15% of the landscape is in relatively undisturbed grass or grass-like vegetation (with a significant forb component) nest success and brood survival problems become less of an issue and pheasant populations can expand.
- Nesting and brood-rearing habitat should have few if any trees or other tall, vertical structures greater than 15-feet in height to minimize raptor perching sites.
- Food plots should be large enough to provide an attractive food source during critical periods and be placed adjacent to secure winter cover. Studies in the midwest have shown that, during some years, the attraction of food plots less than 10 acres in size is lost long before they are needed in late winter because deer and other wildlife remove all the food.
- Enhancing pheasant production on working lands (i.e., actively farmed lands, not just those set aside for wildlife habitat) is critical to healthy pheasant populations, but there are very few, if any, conservation practices for pheasants or other wildlife on working lands in the NRCS Field Office Technical Guide.
- When considering managing pheasants at the landscape level, it is important to be able to incorporate as many of the Farm Bill Programs and other funding sources as possible. This maximizes the incentives for landowners to integrate habitat management into their operations.

- Working with the U.S. Department of Agriculture (NRCS and the Farm Service Agency (FSA)) at the local, state, and federal levels, and directly with farmers and ranchers, will result in more effective program implementation and greater benefits realized by pheasants and other wildlife through Farm Bill Conservation Programs.

Integrating Pheasant Management and Farming (Randy Rodgers):

- Pheasant populations in Kansas have been declining over the past 17 years (Figure 3). Research in Kansas and elsewhere has tied the inability of pheasant populations to recover directly to the high intensity of weed control and the declining height of grain stubbles, particularly in western Kansas.

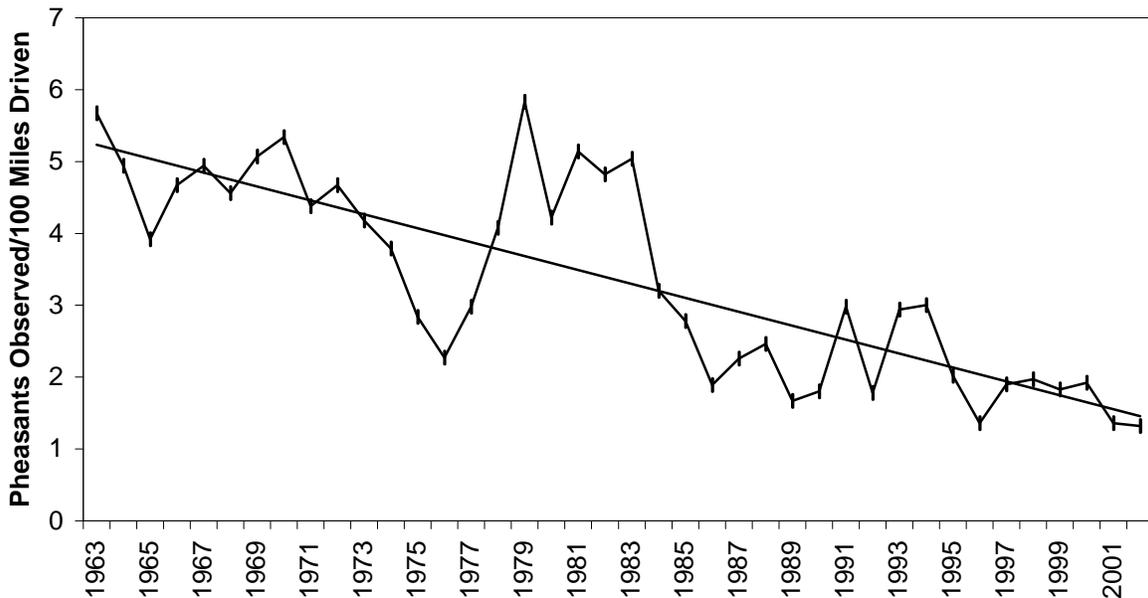


Figure 3. Pheasant population index based on rural route mail carrier survey (KDWP data).

- Herbicide use, along with certain tillage practices, has rendered many parts of western Kansas much less hospitable to pheasants through the actions of limiting available brood habitat and degrading the amount and quality of winter habitat.
- Conservation Reserve Program grassland, mostly without broadleaved brood habitat, has provided only a modest, but critical, buffer against overwhelming pheasant habitat losses in western and north-central Kansas croplands.
- Efforts to improve plant diversity within CRP lands have met with some success and currently offer moderate prospects for gradual pheasant population improvement.
- Wheat stubble height has been the focus of much research in Kansas, both from a farming perspective as well as a wildlife habitat perspective. Researchers have demonstrated that tall stubble is much more efficient than shorter stubble at conserving soil moisture, thus creating a ground-level microclimate more favorable for plant growth.
- First year results in a study conducted by a Kansas State University research agronomist showed a 19 bushel per acre yield advantage for corn no-till drilled into tall wheat stubble over corn no-till drilled into short wheat stubble.

- Research has shown that, when weeds were permitted to grow after harvest, wheat stubble greater than 15 inches tall harbored almost 9 times more pheasants than stubble cut at 7 inches. Furthermore, the research showed that a minimum stubble height of 12 inches is needed to significantly impact pheasant habitat quality.
- An important benefit of taller wheat stubble for pheasants is more vigorous forb production (broadleaved weeds) in the fields, provided no post-harvest weed control occurs. These plants provide brood rearing habitat necessary to produce pheasants and they greatly enhance winter stubble habitat quality.
- Moisture utilized by the weeds after wheat harvest is typically more than offset by the higher amount of water subsequently conserved by the taller, heavier residue.
- The continuous signup CRP (CCRP) has benefited pheasants in Kansas as it has helped farmers provide important pheasant habitat and reduce erosion while enhancing their farming operations.

Direct Seeding (Tim Melville):

- Direct seeding, also called “no till drilling” has been in place for many years. By not turning over the soil prior to seeding, farmers have been able to reduce erosion and increase wildlife habitat values on their property while maintaining a profitable farming operation.
- Direct seeding increases the level of organic matter and moisture in the soil, which improves soil quality. Direct seeding can lead to increased residual vegetation, which decreases erosion and increases soil moisture and ultimately wildlife value.
- Increased soil moisture can also lead to increased crop production.
- The combination of increased environmental benefits and improved profitability for farmers makes direct seeding a viable alternative farming practice.
- Some farmers view direct seeding as unproven and risky.
- Research is needed to make direct seeding a mainline agricultural practice.
- The best way to encourage farmers to use direct seeding is through incentive programs such as EQIP.

Pheasants and CRP in Iowa (Todd Bogenschutz):

- Pheasant population trends in Iowa have been mixed, but declining, over the past 40 years (Figure 4). Research to identify potential management strategies has been ongoing for several years.

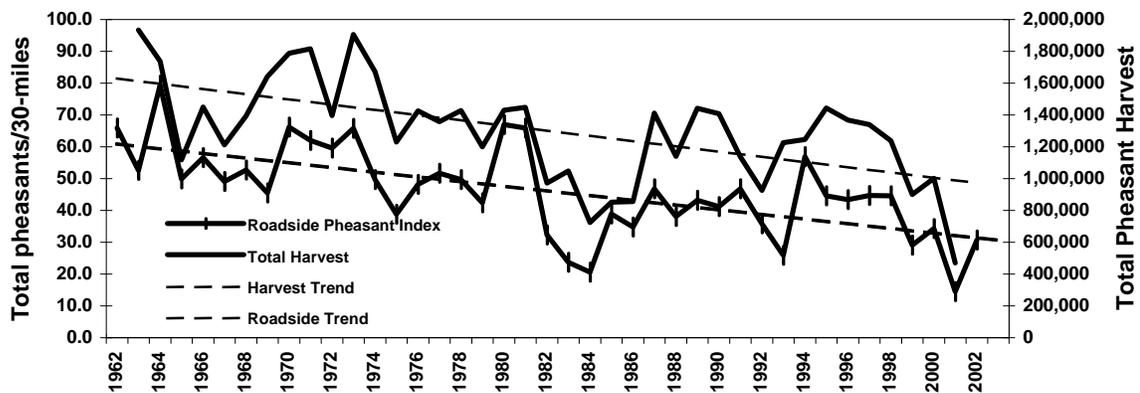


Figure 4. Pheasant harvest and population index trends in Iowa from 1962 – 2002. (IDNR data).

- Research has shown that the percent grassland available on a landscape affects the density of pheasants. In the examples given, one area comprised of 9% grassland had 6 pheasants observed per 30 mile survey route while another area with 26% grassland had 95 pheasants observed per 30 mile survey. Ideally, grasslands contain a mixture of grasses and forbs that provide good nesting cover and are rich in insect life.
- In addition, researchers found that hen pheasant survival was highest in areas with low “edge density” (i.e. the number of meters of edge per hectare of CRP land) and nest success was highest in large, blocky-shaped areas with greater than 40 acres of undisturbed vegetation.
- A model was developed to predict the value of different types of landscape habitat features (no CRP, CRP in blocks, and CRP buffers (25, 50, and 100 % of eligible buffer sites). Results showed that large blocks of CRP had a median amount of grassland acres compared to CRP buffers, however, the vast reduction in edge and increased patch size resulted in better overall pheasant habitat in all four study areas.

#### Farm Bill Report (Alan Fulk):

- The NRCS provides technical assistance to landowners. Much of the technical assistance relates to the Farm Bill.
- There are local working groups that are convened by local Conservation Districts to help identify local resource concerns and priorities. In addition, they serve as a forum to collect local stakeholder input, identify new conservation initiatives, and recommend eligible practices.
- There is also a state technical advisory committee that is lead by the NRCS. It has no enforcement or implementation authority, however it is responsible for reviewing proposals made by the local working groups and providing a recommendation to the State Conservationist.
- Public participation in the local working groups is essential to their function and NRCS encourages landowners and state agencies to participate.
- The 2002 Farm Bill represents the single most significant commitment of resources toward conservation on private lands in the Nation’s history. It places a strong emphasis on the conservation of working lands, ensuring that land remain both healthy and productive.
- Participation in the Farm Bill programs is completely voluntary. In all cases, the landowner makes the final decision whether to participate or not.
- The Farm Bill, with all of the different programs, is expected to bring over \$430 million to Washington between 2002 and 2007.

#### Panel Discussion (Leif, Riley, Rodgers, Bogenschutz, and Fulk):

The question “What are the things Washington should look at to move forward with pheasant management?” was posed to the panel. In addition, the panel fielded questions from the audience. A summary of their responses follows.

- Select key areas of the state where you might be successful at impacting pheasants.
  - Southeastern Washington, the dryland farming area, may be a good place to focus. It is the most likely area in Washington to benefit from CRP.
  - Consider buffer programs in the Columbia River basin. It is important to work with NRCS to determine what can be done.
- Manage pheasants over large landscapes – 20,000 to 50,000 acres minimum.
- Find the “bottlenecks” (factors limiting pheasant populations) and deal with those that give you the greatest benefits first. Different areas of the state will likely have different problems and priorities.

- If possible, determine how much of a habitat type is needed in an area, and then plan out the most beneficial distribution of that habitat type.
- It is important to look at more than just “nesting cover”. In addition, think about “production cover”, which is more diverse and includes all things necessary for good production (e.g. nesting, brood rearing, and escape cover).
- Work with the United States Department of Agriculture (e.g. NRCS) to help define federal program guidelines. Work with local working groups to help develop program qualification criteria best suited to Washington.
- It is important for Washington Department of Fish and Wildlife (WDFW) staff to work closely with NRCS staff. It would be best if WDFW staff could work right in NRCS offices so landowners have all resources available in one place.
- Work with Federal Farm Bill programs and utilize as many sources as possible to match funding. Non-government organizations, such as Pheasants Forever, can help provide matching funding.
- Working with universities and agricultural groups to look at cropping systems in the identified “key areas” is valuable. Together, you can look at ways to improve cropping systems for pheasants and look at ways to get those better practices on the ground.
  - Changing farming practices will take time. It would be beneficial to provide incentives to landowners to try these new systems. To reduce the concern for risk, use small areas on farms as pilot projects.
- One of the hardest tasks will be getting landowners interested and making the program appealing and functional for the working landowner.
- In general, Federal and State programs are not well known to landowners. Landowner involvement is necessary to be successful, so make sure landowner relationships are a priority.
- Released pheasants are important to some hunters. Two important things to keep in mind: 1) releasing pheasants is not an effective population enhancement tool and 2) the program should be self-funded and not take funding away from habitat programs. Let the pheasant hunters help make the decision by asking them what proportion of the existing funding should be spent on stocking pen-reared pheasants or on habitat to restore wild pheasants.
- Habitat enhancement programs must have adequate funding. If you do not fund a program well enough to be able to put quality projects on the ground, then you end up misleading the public.
  - Washington could consider an additional “habitat stamp” or shifting the emphasis of the existing funding.
  - Evaluate what you need and then determine if you can get the funds to accomplish those tasks. If you cannot get the funding to accomplish all of what you need, then try to accomplish part of what you want, as long as the project area is not too small and you don’t sacrifice habitat quality. This is one of the biggest mistakes most states make. They either do not adequately define what they need or they end up accomplishing much too little to have any effect.
- To date, genetics have not been identified as a factor for pheasant population health. Some birds in Iowa were analyzed for DNA and no problems were found.
- While herbicides do affect habitat quality, they do not kill pheasants directly. Insecticides may be harmful and it is well known that organophosphate-based insecticides are very dangerous for birds and can cause death. It would be interesting to see a farm bill program that would provide incentives for alternatives to pesticide use.

## Summary of Key Points:

- Pheasant populations have been declining in many areas of the country.
- Changes in farming practices have reduced the quality and quantity of pheasant habitat.
- Although loss of habitat may not be the only factor currently affecting populations, expert opinion is that population trends cannot be reversed until proper habitat is in place.
- Select areas to focus your efforts. It is better to identify a focus area and be successful there, than spreading human resources, or available funding, too thinly.
- Pheasant management needs to take place on a large enough scale to impact populations over the long term. To focus on small, isolated parcels of habitat would be counter-productive.
- Within the focus area, determine bottlenecks (limiting factors) and identify the most effective distribution and composition of habitat improvements.
- In many places the most limiting habitat type is “production cover” which includes nesting and brood-rearing habitat as well as escape cover. Specifically, pheasants require adequate nesting cover and sufficient insect abundance during brood rearing. Insects often are associated with diverse plant communities with a substantial forb component.
- At least 15% of the landscape must be in relatively undisturbed grass or grass-like vegetation (with a significant forb component) to resolve nest success and brood survival problems. Agricultural landscapes with 25% grassland have been shown to provide the optimum production cover. In addition, nesting and brood-rearing habitat should have few if any trees greater than 15-feet in height to reduce the impact of avian harassment and predation.
- Evaluate what you need and then determine if you can get the funds to accomplish those tasks. If you cannot get the funding, then scale back the size of the area you wish to impact without sacrificing any of the habitat objectives.
- Studies have shown that releasing pen-raised pheasants (both chicks in late summer and hens in the spring) for population establishment is expensive and ineffective.
- Rather than focusing on predator control, emphasis should be placed on controlling predation through providing adequate habitat. Studies in Iowa showed that the highest predator populations occurred on the same landscape that supported the highest pheasant populations, both due to excellent habitat.
- The 2002 Farm Bill has many programs that can help landowners improve habitat conditions for pheasants and other upland wildlife. While these programs are available, it is important for the State of Washington to work closely with the U.S. Department of Agriculture to make sure local and regional wildlife issues are addressed and to help landowners become involved in the programs that are applicable to their property.
- Based on hen survival and nest success, researchers in Iowa have concluded that increasing permanent grass stand acreage increases hen survival and that CRP in large blocks (over 40 acres) is even more beneficial to pheasants than CRP buffer strips.
- Improving pheasant habitat on working lands is an important component to the overall picture. If habitat enhancement is not compatible with a farmer’s operation, then there is little incentive for the landowner to participate.
- Research has shown that retaining at least 12 inches, and preferably 15 inches or more, of wheat stubble after harvesting can result in higher pheasant densities. This is due primarily to an increase in the broad-leaf, weedy habitat that occupies the field after harvest.
- Increased wheat stubble height also can help farmers produce more grain per acre due to increased moisture retention in the soil.
- Direct seeding (no-till drilling) can increase soil quality, reduce erosion and increase value of the property for wildlife.

## Future Pheasant Management In Washington:

If population levels of wild pheasants are going to increase in Washington, focused efforts are needed. Although a list of all of the factors limiting pheasant populations has not been developed, it is apparent that availability of quality habitat is the key component to increasing pheasant populations. Rather than waiting until all of the factors can be identified, implementation of the following management strategies is recommended to begin the long-term process of improving population densities.

- Dedicated WDFW staff is needed to focus on pheasant management and enhancement within identified focus areas of the state.
- Work with USDA programs on a statewide basis and work with NRCS staff within the state. Co-locate WDFW staff in NRCS offices to maximize interagency interaction and develop and maintain landowner relationships.
- Pheasant management should be done on a large-scale (i.e., over 60 mi<sup>2</sup>) and should be focused in areas where meeting desired habitat conditions is most attainable.
  - Focus pheasant management efforts in southeastern Washington, specifically Columbia, Garfield, Walla Walla, and Whitman counties and other areas where adequate rainfall (i.e., over 14 inches) is conducive to supporting desirable, appropriate plant communities.
    - Farm Bill implementation:
      - Work with NRCS local working groups.
      - Work closely with landowners. Help provide technical assistance for all USDA Farm Bill programs as well as other federal and state funding sources (e.g., Salmon Recovery Funding Board and Eastern Washington Pheasant Enhancement Program).
    - Integrate as many fund sources as possible (including state, non-government organization (e.g., Pheasants Forever) and Federal funds (Farm bill and others (e.g., salmon recovery)) to accomplish habitat improvement goals.
    - Emphasize the development of adequate pheasant “production cover”, including stressing the importance of quality brood rearing habitat.
    - Small habitat projects need to integrate with the overall habitat needs for a larger area.
    - Develop pheasant population monitoring protocols in areas of emphasis. Where applicable, monitor to determine the benefits pheasant habitat management has on other wildlife species (e.g., threatened and endangered species).
    - Target hunter access improvement opportunities within the focus area.
  - Efforts to increase pheasant populations on irrigated lands of eastern Washington should focus on working with the NRCS to identify ways for landowners to participate in Farm Bill Programs.
    - Options may be limited to establishing Continuous CRP (CCRP) buffers, wetland enhancement projects, and other projects focusing on upland areas associated with some type of open water or wetland.
    - Work with NRCS local working groups and local Conservation Districts.
- Releasing pen-raised pheasants in eastern Washington is important to some hunters. WDFW will continue to release pen-raised pheasants, however, these releases will not be part of focused pheasant population management for the state.
- Work with Washington State University (WSU) and the Extension Agent Program to help develop and promote farming practices that are beneficial to pheasants and retain or improve profitability for the landowner. This would include, but not be limited to, field preparation, seeding, and harvesting.
  - Discuss Kansas State University and Kansas Wildlife and Parks research findings and see how they may apply to Washington.

- Work together with WSU and the Pacific Northwest Direct Seed Association to help identify additional locations for direct seeding.
- Pheasant habitat on WDFW owned or managed lands may be targeted as habitat improvement demonstration areas.
  - Focus on developing quality pheasant habitat that does not require intensive, ongoing maintenance.

### Literature Cited:

Rice, C.G. 2003. Utility of pheasant call counts and brood counts for monitoring populations density and predicting harvest. *Western North American Naturalist* 63(2):178-188.